

**REMARKS**

Claims 1-8 are pending. By this Amendment, Claims 1 and 8 are amended. Applicants respectfully submit no new matter is presented herein.

**Claim Rejections – 35 U.S.C. §112**

Claim 8 is rejected under 35 U.S.C. §112, second paragraph. Applicants have amended the claim responsive to the rejection. Withdrawal of the rejection is respectfully requested.

**Claims 1-8 Recite Patentable Subject Matter**

Claim 1 is rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,300,936 to Izadian in view of U.S. Patent No. 6,097,345 to Walton. Claim 1 is also rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2004/0056811 to Pakray et al. (hereinafter “Pakray”) in view of U.S. Patent No. 6,097,345 to Walton. Claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over Izadian in view of Walton as applied to Claim 1 above, and further in view of U.S. Patent No. 3,845,489 to Sauer et al. (hereinafter “Sauer”) or Japanese Patent Document No. 09-181525 to Seshimo et al. (hereinafter “Seshimo”). Claim 2 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Pakray in view of Walton as applied to Claim 1 above, and further in view of Sauer or Seshimo. Claim 3 is rejected under 35 U.S.C. §103(a) as being unpatentable over Izadian in view of Walton as applied to Claim 1 above, and further in view of U.S. Patent No. 6,795,023 to Chen. Claim 3 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Pakray in view of Walton as applied to Claim 1 above, and further in view of Chen. Claim 4 is rejected under 35 U.S.C. §103(a) as being unpatentable over Izadian in view

of Walton, Sauer, and Seshimo, as applied to Claims 1-2, and further in view of Chen. Claim 4 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Pakray in view of Walton, Sauer, and Seshimo, as applied to Claim 1-2, and further in view of Chen. Claim 5 is rejected under 35 U.S.C. §103(a) as being unpatentable over Izadian in view of Walton as applied to Claim 1 above, and further in view of U.S. Patent No. 5,274,391 to Connolly. Claim 5 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Pakray in view of Walton as applied to Claim 1 above, and further in view of Connolly. Claim 6 is rejected under 35 U.S.C. §103(a) as being unpatentable over Izadian in view of Walton as applied to Claim 1 above, and further in view of U.S. Patent No. 5,936,587 to Gudilev et al. (hereinafter "Gudilev"). Claim 6 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Pakray in view of Walton as applied to Claim 1 above, and further in view of Gudilev. Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Izadian in view of Walton, Sauer, and Seshimo, as applied to Claims 1-2, and further in view of Gudilev. Claim 7 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Pakray in view of Walton, Sauer, and Seshimo, as applied to Claim 1-2, and further in view of Gudilev. Claim 8 is rejected under 35 U.S.C. §103(a) as being unpatentable over Izadian in view of Walton as applied to Claim 1 above, and further in view of U.S. Patent No. 5,872,546 to Ihara et al. (hereinafter "Ihara"). Claim 8 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Pakray in view of Walton as applied to Claim 1 above, and further in view of Ihara.

Applicants respectfully traverse each of the above-listed rejections for the following reasons.

Independent Claim 1 recites an on-board antenna including a grounding conductor provided on a surface of a first dielectric substrate; and an antenna element having a first radiation element provided on the surface of the first dielectric substrate; and a second radiation element provided on the first radiation element so as to protrude from a surface of the first dielectric substrate and extend in a vertical direction, wherein the first radiation element and the grounding conductor are provided on the same surface of the dielectric substrate.

Among other features, Claim 1 recites the inventive on-board antenna includes a radiation element and a grounding conductor provided on the same surface of a dielectric substrate.

Applicants respectfully submit the applied art of record, alone or in combination, fail to teach or suggest all of the claimed features.

In particular, regarding the rejection of Claim 1 and with respect to Izadian, Applicants respectfully note the Office Action admits Izadian fails to disclose or suggest the first radiation element (24) of the antenna element being provided on the same surface of the first dielectric substrate (34) as the grounding conductor (28). Applicants note Izadian discloses a planar radiator (24), a loop radiator (26), a dielectric layer (34), and a conducting plate (28). The radiator 24, 26 is disposed on an opposite side of the dielectric layer (34) on which the conducting plate (28) is disposed, as shown in Figure 1 of Izadian. However, the Office Action attempts to overcome the admitted and above-described deficiency in the Izadian disclosure by arguing that it would have been obvious to one of ordinary skill in the art to modify the Izadian antenna assembly (20) to mount the first radiation element (24) and the grounding conductor (28) on the same

side of the first dielectric substrate (34) as taught by Walton. The Office Action argues the supposed motivation for modifying Izadian according to the teachings of Walton would be to provide a "more compact structure."

Applicants respectfully submit that modifying Izadian as proposed by the Office Action would not be obvious to one of ordinary skill in the art and would be contrary to the specific teachings of Izadian.

In particular, Applicants respectfully note the antenna assembly (20) disclosed by Izadian includes:

. . . a telescoping rod shaped radiator 22, a planar radiator 24 in the shape of a patch disposed about a base of the rod radiator 22, and a loop radiator 26 encircling both the planar radiator 24 and the rod radiator 22. The rod radiator 22, the planar radiator 24, and the loop radiator 26 are supported upon a metallic, electrically-conducting plate 28 which serves as a ground plane of the antenna assembly 20, and also forms the top of a metallic box 30 which serves as a base of the antenna assembly 20. The box 30 encloses coupling circuitry 32 by which external electronic components are coupled to the planar radiator 24 and the loop radiator 26, and to the body of the vehicle 30 as extended ground plane.

The planar radiator 24 is supported by a dielectric layer 34 which rests upon the plate 28 and serves as a spacer for providing a desired spacing between the planar radiator 24 and the plate 28. The dielectric layer 34 extends outward beyond the planar radiator 24 to support the loop radiator 26 and to serve as a spacer between the loop radiator 26 and the plate 28. This form of construction is recognized as the microstrip form of construction . . . (emphasis added)

See column 3, lines 45-67 and Figures 1 and 3 of Izadian.

As is clear from the above-emphasized passage, the Izadian antenna assembly (20) desires the spacing provided by positioning the dielectric layer (34) between the grounding conductor (28) and the first radiation element (24) so as to form the microstrip form of construction.

To establish *prima facie* obviousness, three basic criteria must be met, the first being that there must be some suggestion or motivation in the applied references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings of the references. See M.P.E.P. §2143.

Obviousness can only be established by combining or modifying the teachings of the applied art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." See *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Izadian clearly discloses the desire to space the grounding conductor (28) from the first radiation element (24) by positioning the first dielectric layer (34) therebetween to form the microstrip type of construction. Modifying the structural arrangement so that the grounding conductor (28) and first radiation element (24) are on the same surface of the first dielectric layer (34), as taught by Walton, would eliminate the form of

construction desired by Izadian. Put simply, the teachings of Izadian and Walton conflict.

The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art, and all teachings in the prior art must be considered to the extent that they are in analogous arts. Where the teachings of two or more prior art references conflict, the Examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another. See *In re Young*, 927 F.2d 588, 18 USPQ2d 1089 (Fed. Cir. 1991).

Izadian states the structural construction disclosed therein forms a desired microstrip construction. The Office Action asserts modifying Izadian according to the teachings of Walton would be obvious to one of ordinary skill in the art because it will result in a more compact arrangement. Applicants respectfully submit that Izadian specifically chose the disclosed structural arrangement of the grounding conductor (28), first dielectric layer (34), and first radiation element (24) so as to achieve the desired microstrip construction. Moreover, Applicants respectfully submit the Office Action has failed to provide any reasoning, in fact or the law, as to why one of ordinary skill in the art would be motivated to sacrifice the desired structural arrangement of the grounding conductor (28), first dielectric layer (34), and first radiation element (24) so as to have a more compact structure, especially when Izadian is primarily concerned with overcoming the problems in the industry and providing advantages by an antenna system which is constructed as a unitary antenna assembly having separate portions, or components, which are operative in respective ones of the foregoing frequency bands

designated for providing the functions of keyless entry, GPS, AM-FM radio, and cellular telephony. See column 1, lines 60-67 of Izadian.

Moreover, Applicants respectfully submit that it is well known that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the applied art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

As such, Applicants respectfully submit that one of ordinary skill in the art would not be motivated to modify Izadian to have the grounding conductor (28) and first radiation element (24) on the same surface of the first dielectric substrate (34) as taught by Walton as the resulting modified Izadian antenna assembly would not have the specific structural construction desired by Izadian, i.e., the microstrip construction.

Sauer merely discloses a window antenna that is mounted in conductive lines on a supporting surface, such as a car window, the lines forming a cruciform antenna within a bipolar antenna both of which are attached to a common terminal. See the Abstract. As such, Applicants respectfully submit Sauer does not overcome or otherwise address the drawbacks and deficiencies in the purported Izadian and Walton combination.

Seshimo merely discloses a pair of antenna elements including a first element that consists of a metallic plate integrally formed by mutually connecting lower parts of a reverted L-shaped antenna through a T-shaped antenna while the second element includes a metallic plate integrally formed by mutually connecting lower parts of a T-shaped antenna and a reverse L-shaped antenna, wherein both elements are erected on a rectangular ground plate in parallel along a longitudinal direction. As such,

Applicants respectfully submit Seshimo does not overcome or otherwise address the drawbacks and deficiencies in the purported Izadian and Walton combination.

Chen is applied merely for teaching it is known in the industry to have grounding conductors with notched portions. As such, Applicants respectfully submit Chen does not overcome or otherwise address the drawbacks and deficiencies in the purported Izadian and Walton combination.

Connolly is applied merely for teaching it to be known in the industry to provide a second radiation element that has an I-shape. As such, Applicants respectfully submit Connolly does not overcome or otherwise address the drawbacks and deficiencies in the purported Izadian and Walton combination.

Gudilev is applied merely for teaching it to be known in the industry to provide a second dielectric substrate upon a first dielectric substrate in a perpendicular manner. As such, Applicants respectfully submit Gudilev does not overcome or otherwise address the drawbacks and deficiencies in the purported Izadian and Walton combination.

Ihara is applied merely for teaching it to be known in the industry to provide a radiation element that is a semiconductor. As such, Applicants respectfully submit Ihara does not overcome or otherwise address the drawbacks and deficiencies in the purported Izadian and Walton combination.

Therefore, Applicants respectfully submit any combination of any of Izadian, Walton, Sauer, Seshimo, Chen, Connolly, Gudilev, and Ihara do not render obvious the subject matter recited by Claim 1. Accordingly, Applicants respectfully submit Claim 1

should be deemed allowable over any combination of any of Izadian, Walton, Sauer, Seshimo, Chen, Connolly, Gudilev, and Ihara.

Claims 2-8 depend from Claim 1. It is respectfully submitted that these seven (7) dependent claims be deemed allowable for the same reasons Claim 1 is allowable, as well as for the additional subject matter recited therein.

Applicants respectfully request withdrawal of each of the rejections based on Izadian and Walton.

As discussed above, independent Claim 1 recites an on-board antenna including a grounding conductor provided on a surface of a first dielectric substrate; and an antenna element having a first radiation element provided on the surface of the first dielectric substrate; and a second radiation element provided on the first radiation element so as to protrude from a surface of the first dielectric substrate and extend in a vertical direction, wherein the first radiation element and the grounding conductor are provided on the same surface of the dielectric substrate.

Applicants respectfully submit the applied art of record, alone or in combination, fail to teach or suggest all of the claimed features.

In particular, regarding the rejection of Claim 1 and with respect to Pakray, Applicants respectfully note the Office Action admits Pakray fails to disclose or suggest the first radiation element (16) of the antenna being provided on the same surface of the first dielectric substrate (14) as the grounding conductor (30). Applicants respectfully note Pakray discloses a printed circuit (16) as a radiation element, a dielectric medium (14), and a conductive member (30). The printed circuit (16) is provided on the opposite side of the dielectric medium (14) on which the conductive member (30) is provided, as

shown in Figure 2 of Pakray. However, the Office Action attempts to overcome the admitted and above-described deficiency in the Pakray disclosure by arguing that it would have been obvious to one of ordinary skill in the art to modify the Pakray antenna to mount the first radiation element (16) and the grounding conductor (30) on the same side of the first dielectric substrate (14) as taught by Walton. Again, the Office Action argues the supposed motivation for modifying Pakray according to the teachings of Walton would be to provide a "more compact structure."

Applicants respectfully submit that modifying Pakray as proposed by the Office Action would not be obvious to one of ordinary skill in the art and would be contrary to the specific teachings of Pakray.

In particular, Applicants respectfully note the antenna disclosed by Pakray includes:

[0015] The dielectric medium 14 has a second (lower) surface, provided on the bottom side. An electrically conductive member 30 is mounted to the lower second surface of the dielectric medium 14. The arrangement of the electrically conductive member 30 below antenna 12 and separated via dielectric medium 14 provides for the formation of a capacitive coupling between the electrically conductive member 30 and the antenna 12. The electrically conductive member 30 is not electrically connected to an electrical ground. Instead, electrically conductive member 30 is dielectrically isolated from the vehicle electrical ground and, thus, acts as a floating ground. This is in contrast to a metallic vehicle body panel having a much greater surface area which acts as the vehicle electrical ground.

[0016] The electrically conductive member 30 is positioned directly below the antenna 12 and may be configured in various shapes, such as a circular shape as shown in FIG. 3 or a rectangular shape (not shown). The electrically conductive member 30 has a dimension, such as a diameter  $D_c$ , of at least 130 mm for a circular conductive member. For a rectangular electrically conductive member 30, at least one of the length and width has a dimension  $D_c$  of at least 130 mm. The antenna 12 interfaces with the first surface of the dielectric medium 14 within a first surface are of the dielectric medium 14 defined by the adjoining surfaces. The electrically

conductive member 30 has a second surface area interfacing with the second surface of the dielectric medium 14 as defined by the adjoining surfaces. The second surface are of the electrically conductive member 30 is at least as large as the first surface are of the antenna 12.

[0017] By providing a capacitive coupling between antenna 12 and electrically conductive member 30, the floating ground plane provided by electrically conductive member 30 results in a stable impedance, improves the average gain values, improves the average values for terrestrial and satellite antenna elements, and enhances minimum gain values. In addition, the ripple (maximum/minimum signal ratio) is also lowered as a result of this antenna mount arrangement. Consequently, the signal performance of the antenna 12 is dramatically improved by providing the capacitive coupling to the floating ground plane.

See paragraphs [0015] through [0017] of Pakray.

As is clear from the above-emphasized passage, the Pakray antenna specifically structures the grounding conductor (30) below the first dielectric substrate (14) and separate from the first radiation element (16) so as to provide a capacitive coupling between the grounding conductor (30) and the antenna (12). Moreover, by providing a capacitive coupling between antenna (12) and electrically conductive member (30), the floating ground plane provided by electrically conductive member (30) results in a stable impedance, improves the average gain values, improves the average values for terrestrial and satellite antenna elements, and enhances minimum gain values. In addition, the ripple (maximum/minimum signal ratio) is also lowered as a result of this antenna mount arrangement. Consequently, the signal performance of the antenna (12) is dramatically improved by providing the capacitive coupling to the floating ground plane.

To establish *prima facie* obviousness, three basic criteria must be met, the first being that there must be some suggestion or motivation in the applied references themselves or in the knowledge generally available to one of ordinary skill in the art, to

modify the reference or to combine the teachings of the references. See M.P.E.P. §2143.

Obviousness can only be established by combining or modifying the teachings of the applied art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." See *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Pakray clearly discloses the desire and benefits associated with having the grounding conductor (30) and first radiation element (16) on opposing surfaces of the first dielectric substrate (14). The benefits being clearly articulated in paragraph [0017] of Pakray. Modifying the structural arrangement so that the grounding conductor (30) and first radiation element (16) are on the same surface of the first dielectric layer (14), as taught by Walton, would eliminate the form of construction desired by Pakray, as well as the numerous benefits sought to be obtained thereby. Put simply, the teachings of Pakray and Walton conflict.

The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art, and all teachings in the prior art must be considered to the extent that they are in analogous arts. Where the teachings of two or more prior art references conflict, the Examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another. See *In re Young*, 927 F.2d 588, 18 USPQ2d 1089 (Fed. Cir. 1991).

Pakray states the disclosed structural arrangement obtains numerous benefits thereby. The Office Action asserts modifying Pakray according to the teachings of Walton would be obvious to one of ordinary skill in the art because it will result in a more compact arrangement. Applicants respectfully submit that single benefit obtained by modifying the Pakray antenna as asserted by the Office Action is far outweighed by the numerous benefits derived by maintaining the grounding conductor (30) and first radiation element (16) on separate and opposing surfaces of the first dielectric substrate (14). Moreover, Applicants respectfully submit the Office Action has failed to provide any reasoning, in fact or the law, as to why one of ordinary skill in the art would be motivated to sacrifice the numerous benefits obtained by the existing Pakray structure simply to have a more compact structure.

Moreover, Applicants respectfully submit that it is well known that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the applied art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

As such, Applicants respectfully submit that one of ordinary skill in the art would not be motivated to modify Pakray to have the grounding conductor (30) and first radiation element (16) on the same surface of the first dielectric substrate (14) as taught by Walton as the resulting modified Pakray antenna would not provide a capacitive coupling between antenna (12) and electrically conductive member (30), there would be no floating ground plane provided by electrically conductive member (30) that results in a stable impedance; there would be no improvement in average gain values; there would be no improvement in the average values for terrestrial and satellite antenna elements, and enhances minimum gain values; the ripple (maximum/minimum signal ratio) would not be lowered as a result of the modified antenna mount arrangement. Consequently, the signal performance of the modified Pakray antenna (12) would not be dramatically improved since a capacitive coupling would not be provided to the floating ground plane.

Sauer merely discloses a window antenna that is mounted in conductive lines on a supporting surface, such as a car window, the lines forming a cruciform antenna within a bipolar antenna both of which are attached to a common terminal. See the Abstract. As such, Applicants respectfully submit Sauer does not overcome or otherwise address the drawbacks and deficiencies in the purported Pakray and Walton combination.

Seshimo merely discloses a pair of antenna elements including a first element that consists of a metallic plate integrally formed by mutually connecting lower parts of a reverted L-shaped antenna through a T-shaped antenna while the second element includes a metallic plate integrally formed by mutually connecting lower parts of a T-

shaped antenna and a reverse L-shaped antenna, wherein both elements are erected on a rectangular ground plate in parallel along a longitudinal direction. As such, Applicants respectfully submit Seshimo does not overcome or otherwise address the drawbacks and deficiencies in the purported Pakray and Walton combination.

Chen is applied merely for teaching it is known in the industry to have grounding conductors with notched portions. As such, Applicants respectfully submit Chen does not overcome or otherwise address the drawbacks and deficiencies in the purported Pakray and Walton combination.

Connolly is applied merely for teaching it to be known in the industry to provide a second radiation element that has an I-shape. As such, Applicants respectfully submit Connolly does not overcome or otherwise address the drawbacks and deficiencies in the purported Pakray and Walton combination.

Gudilev is applied merely for teaching it to be known in the industry to provide a second dielectric substrate upon a first dielectric substrate in a perpendicular manner. As such, Applicants respectfully submit Gudilev does not overcome or otherwise address the drawbacks and deficiencies in the purported Pakray and Walton combination.

Ihara is applied merely for teaching it to be known in the industry to provide a radiation element that is a semiconductor. As such, Applicants respectfully submit Ihara does not overcome or otherwise address the drawbacks and deficiencies in the purported Pakray and Walton combination.

Therefore, Applicants respectfully submit any combination of any of Pakray, Walton, Sauer, Seshimo, Chen, Connolly, Gudilev, and Ihara do not render obvious the

subject matter recited by Claim 1. Accordingly, Applicants respectfully submit Claim 1 should be deemed allowable over any combination of any of Pakray, Walton, Sauer, Seshimo, Chen, Connolly, Gudilev, and Ihara.

Claims 2-8 depend from Claim 1. It is respectfully submitted that these seven (7) dependent claims be deemed allowable for the same reasons Claim 1 is allowable, as well as for the additional subject matter recited therein.

Applicants respectfully request withdrawal of each of the rejections based on Pakray and Walton.

**Conclusion**

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding rejections, allowance of the Claims 1-8, and the prompt issuance of a Notice of Allowability are respectfully solicited.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing docket number 107355-00101.**

Respectfully submitted,  
**ARENT FOX PLLC**



Murat Ozgu  
Attorney for Applicants  
Registration No. 44,275

**Customer No. 004372**

1050 Connecticut Avenue, NW, Suite 400  
Washington, DC 20036-5339  
Telephone: (202) 857-6000

CMM:MO/elp